I. PATENT ABSTRACTS OF JAPAN

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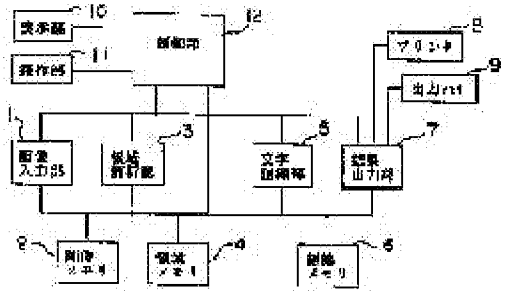
(54) DOCUMENT READER



(57)Abstract:
PROBLEM TO BE SOLVED: To omit the image reduction processing, to reduce the image memory capacity, to shorten the processing time and to reduce the processing load by applying the area analysis to the image data inputted with low resolution, inputting only the area part in an image after the area analysis, and inputting the images in a mode corresponding to the area type after the area analysis.
SOLUTION: A document reader consists of an image input part 1, an image memory 2, an area analysis part 3, an area memory 4, a character recognition part 5, etc. In such a constitution, the characters of images recorded on a recording medium are scanned for production of the image data of low resolution. Then the area data are generated based on the image data. The characters or images recorded on the recording medium are scanned again based on the area data, and the image data are produced for every area. Furthermore, the image data on the character areas are recognized based on the area data, and the recognition data are produced. Then the optional document data are produced from the image data, the area data and the recognition data and outputted to an output medium.

[JP, 09-062782,A] Published March 7, 1997

NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]A document reader comprising:
A low resolution picture input means which scans a character or an image recorded on a recording medium, changes into a picture signal, carries out digital conversion of this picture signal, and creates image data of a low resolution.
A low resolution picture memory which stores this image data.
A field analysis means to create area information based on low resolution image data in this low resolution picture memory.
A region image input means which rescans a character or an image recorded on said recording medium according to area information in a field memory which stores this area information, and this field memory, and creates that required image data for every field, A region image memory which stores this image data, and a character recognition means which recognizes image data of a character area in said region image memory, and creates recognition data according to area information in said field memory, Result output **** which creates arbitrary document data from area information in a recognition memory which stores this recognition data, and image data in said region image memory and said field memory, and recognition data in said recognition memory, and outputs this document data to an output media.

[Claim 2]The document reader according to claim 1, wherein said region image input means is provided with a function which amends a gap with area information in a field memory, and rescanned image data.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the character recorded on the document, and the document reader which reads images (figures, pictures, photographs, ruled lines, etc. other than a character).
[0002]
[Description of the Prior Art]Drawing 7 is a flow chart of the reading processing in the conventional document reader, and is a flow chart of the processing scanned especially without a

prescan with high resolution from the beginning. Based on drawing 7, the reading processing in the conventional document reader is explained. First, the image input of the reading object document is carried out with high resolution (S101). The high resolution images inputted by S101 are displayed on a display, and an operator specifies the range required for reading by a frame (S103). When a reading range is a whole page, processing of this frame specification is unnecessary.

[0003]Next, the reduction image which is needed for field analysis is created (S105). Drawing 8 is an explanatory view explaining creation of a reduction image. In drawing 8, 210 is the high-resolution image data inputted by processing ofS101, and 211 are the reduced image data created by processing ofS105. If this reducing process has a 1 or more dot black pixel, for example in high resolution images of 8x8 dots, 1 dot of reduction images will be made into black, and if all of high resolution images are white picture elements, let 1 dot of reduction images be whites. Namely, to field analysis, the high-resolution image data is unnecessary, and there should just be rough (low resolution) image data. Next, a field is extracted from the reduction image created by S105, and field analysis discriminated from a picture feature with a character and an image about this field is conducted further (S107). And the character of a high-resolution image data is recognized based on the result of this field analysis (S109). This recognition result is stored in a memory, or it prints to a printer, a recognition result is outputted, and processing is ended (S111).

[0004]Drawing 9 is a flow chart of the reading processing in other conventional document readers, and the prescan of it is carried out especially with a low resolution, and it specifies a reading frame. Based on drawing 9, the reading processing in a ****** reader is outlined conventionally. First, a prescan is carried out with a low resolution, a low resolution picture is inputted (S121), the inputted low resolution picture is displayed on a display, and an operator specifies a reading range by a frame (S123). Next, a reading frame portion is scanned and an image input is carried out with high resolution (S125). The same processing as S105-S111 which were shown in drawing 7 is performed after this.

[0005]

[Problem(s) to be Solved by the Invention]However, there are the following problems in the conventional method described above. That is, the reduction image creation which is processing of S105 needs to be processed. In order to acquire pictures (a multiple value, a color, etc.) other than the high resolution images which are needed by the processing after recognition processing (S109), a re-scan is required, but when re-scanning after field analysis, re-scanning time will start for a long time. High resolution images other than a required field will be inputted, and the process flow shown in drawing 7 will take useless time.

[0006]

[Means for Solving the Problem]A document reader of this invention is characterized by comprising:

A low resolution picture input means which scans a character or an image recorded on a recording medium, changes into a picture signal, carries out digital conversion of this picture signal, and creates image data of a low resolution.

A low resolution picture memory which stores this image data.

A field analysis means to create area information based on low resolution image data in this low resolution picture memory.

A region image input means which rescans a character or an image recorded on said recording medium according to area information in a field memory which stores this area information, and

this field memory, and creates that required image data for every field, A region image memory which stores this image data, and a character recognition means which recognizes image data of a character area in said region image memory, and creates recognition data according to area information in said field memory, Result output **** which creates arbitrary document data from area information in a recognition memory which stores this recognition data, and image data in said region image memory and said field memory, and recognition data in said recognition memory, and outputs this document data to an output media.

[0007]In a document reader constituted as mentioned above, a character or an image recorded on a recording medium is scanned, image data of a low resolution is created, and area information is created based on this low resolution image data. And a character or an image recorded on said recording medium according to this area information is rescanned, and that required image data is created for every field. According to said area information, image data of a character area is recognized and recognition data is created. Arbitrary document data is created from image data, area information, and recognition data, and this document data is outputted to an output media.
[0008]
[Embodiment of the Invention]
Embodiment 1. drawing 1 is a block diagram showing the composition of a 1st embodiment of this invention. In a figure, 1 is an image input part, it scans optically all/some of document of a reading object, changes into a picture signal the character and image which were recorded on the document by photoelectric conversion, and changes this picture signal into the image data of binary / multiple value / false multiple value / color further. 2 is an image memory and stores the image data outputted from the face image input part 1. 3 is an area analysis section, it extracts a field from the image data (low resolution binary) in the image memory 2, discriminates each field from a character with an image, and creates area information. 4 is a field memory and stores the area information outputted from the area analysis section 3.
[0009]5 is a character recognition section, cuts down and carries out character recognition of the character image of this image data for every single character, and changes it into a character code from the area information in the field memory 4, and the image data in the image memory 2. And let this character code be recognition data. The character recognition section 5 can carry out the knowledge based system of this recognition data, and can also correct it. 6 is a recognition memory and stores the recognition data outputted from the character recognition section 5. 7 is a result output part and The image data in the image memory 2, and the area information in the field memory 4, Document data is created from the recognition data in the recognition memory 6, and (at least one of image data, area information, and the recognition data), and this document data is printed with the printer 8, or it stores in the output memories 9. And these output memories 9 are passed and they are other document data processing systems (document data is passed to a word processor, a DTP system, a documentation management system (not shown), etc.). Or document data can also be passed to other document data processing systems by communication (not shown).
[0010]10 is an indicator which consists of CRT etc. 11 is a final controlling element which consists of a keyboard, a mouse, etc. -- reading processing (the whole.) The interface of the operator and document reader of a start and termination indication, the display of a processing result (image data, area information, and recognition data), its check, correction, etc., etc. which are called processing is taken. [a part]
[0011]Drawing 2 is a flow chart of operation of the embodiment constituted as mentioned above.

Hereafter, operation of this embodiment is explained based on drawing 2. First, the prescan which carries out an image input with a low resolution by the image input part 1 is carried out (S1). By the image input part 1, a prescan scans the input sentence document of a reading object, changes into a picture signal the character recorded on the document, and an image by photoelectric conversion, and changes this picture signal into the image data of a binary low resolution (for example, 50DPI) further. And this image data is stored in the image memory 2.
[0012]After an image input finishes, an operator specifies a reading frame using the indicator 10 and the final controlling element 11 (S2). That is, the image data in the image memory 2 is displayed on the indicator 10, an operator looks at this display, and a portion required for reading is specified as a reading frame (a rectangle, a polygon) using the final controlling element 11. This reading frame specification is used when avoiding the shadow by a copy, or reading only one article in newspaper, and reading a part of image data. In order to operate it simply, when you do not specify a reading frame, let all the image data be reading objects.
[0013]After reading frame specification finishes, field analysis is conducted by the area analysis section 3 (S3). Field analysis extracts an area frame from the image data in the image memory 2 corresponding to said reading frame by the area analysis section 3 first using a character, the method which uses the marginal distribution histogram of a black pixel for an image, or the method using a run length. And a field is identified according to the geometric feature of each field to a character area (according to specification of an operator, it is not necessary to identify automatically discernment of Japanese/English, and Japanese/English), and an image (figure/photograph) field. And let this area frame and its kind be area information.
[0014]This field analyzing method is the same as that of the field analysis to a reduction image. This area information and image data are displayed on the indicator 10 in piles, and an operator checks and corrects area information. The area information after a check / correction is stored in the field memory 4. An example of the image data (: which does not specify a reading frame a reading object all the image data) of the area information is shown in drawing 3. Field analysis of this image data is conducted, and the Japanese field 21, the English field 22, the graphic region 23, and the photographic area 24 are extracted. Table 1 expresses this area information in a table.
[0015]
[Table 1]

Xs	Ys	Xe	Ye	種類
39	59	197	197	和文
236	59	374	217	英文
39	256	197	492	図形
236	256	374	354	写真

解像度：50 DPI

[0016]In Table 1, the coordinates of the peak at the upper left of a field, and "Xe, Ye" are coordinates of the peak at the lower right of a field (a field is expressed with a rectangle and expressed with the dot number in resolution 50DPI at the time of a prescan), and "the kind of "Xs, Ys"" is a discriminated result of a field. After field analysis finishes, the scan which carries out an image input in the mode corresponding for every field by the image input part 1 is carried out (S4). By the image input part 1, this scan carries out the image input of the portion corresponding to the area information in the field memory 4 by corresponding picture ON

KAMODO.

[0017]Drawing 4 is a flow chart of the example of this scan, and explains this scan based on drawing 4 below. First, the rectangle (39, 59) which includes all the fields from the area information in the field memory 4, and (374,492) are computed (S21). Table 2 is a table showing the kind of read object, and the image input mode to this.

[0018]

[Table 2]

種類	画像入力モード	
	解像度(DPI)	変換方式
和文	４００	単純２値
英文	２００	単純２値
図形	２００	単純２値
写真	２００	疑似多値

[0019]As shown in Table 2, the maximum resolution in the image input mode of the image data shown in drawing 3 is 400DPI to Japanese, and if said rectangle is converted in 400DPI (312,472), it will be set to (2992-3936) (S22). The image input of this rectangle (312,472) and (2992-3936) is carried out by maximum resolution 400DPI and a multiple value (S23).

[0020]Table 3 converts the peak of each field shown in Table 1 in maximum resolution 400DPI.

[Table 3]

	Xs	Ys	Xe	Ye
1120	312	472	1576	1576
1130	1888	472	2992	1736
1140	312	2048	1576	3936
1150	1888	2048	2992	2832

400DPIでの換算値

[0021]The multi value image data inputted by S22 according to Table 3 is extracted every four fields (S24). The extracted image data is changed according to the resolution and the conversion method of Table 2 for every field (S25). The changed image data is stored in the image memory 2 for every field (S26), and processing of a scan is ended. A scan (S4) recognizes a character to be ****** by the character recognition section 5 (S5). It is as follows when the method of this character recognition is outlined. First, a line is started using the method of using the marginal distribution histogram of a black pixel, or the method of using a run length from the image data in the image memory 2 corresponding to the character area of the area information in the field memory 4, and a character is further started from a line. It changes into a character code (the reliability of candidates characters and candidates characters is included) with pattern matching using the recognition dictionary which stored the recognition feature of the standard character which is in the character recognition section 5 about the cut-down character image next. A knowledge based system can be carried out using the word dictionary which is in the character

recognition section 5 about this character code, and the knowledge dictionary which stored the grammar rule, and a character code can also be corrected (the reliability of a ** assistant word and a candidate word is created).
[0022]Let this character code (candidates characters and a candidate word are included) and reliability be recognition data. This recognition data is displayed on the indicator 10 (comparing with the picture of a character area), and an operator checks and corrects recognition data. The recognition data after a check / correction is stored in the recognition memory 6. After recognition finishes, a reading result is outputted by the result output part 7 (S6). The result output part 7 Namely, image data in the image memory 2 and area information in the field memory 4, Document data is created from the recognition data in the recognition memory 6, and (at least one of image data, area information, and the recognition data), and this document data is printed with the printer 8, or it stores in the output memories 9.
[0023]According to the Embodiment 1, the effect taken below can be acquired as mentioned above.
(1) Since picture reduction becomes unnecessary by conducting field analysis of the image data inputted with the low resolution, shortening of processing time and mitigation of the processing load of a document reader are attained.
(2) Since the image input only of the area part is carried out after field analysis, the image data of blank parts other than a field can become unnecessary, and image memory capacity can be reduced, and the processing time after a scan can be shortened.
(3) Since an image input is carried out in the mode corresponding to a field kind after field analysis, image data suitable for the processing after recognition can be obtained, and reduction of down stream processing and shortening of (an image input etc. are unnecessary in an example:photographic part at a false multiple value) and processing time are attained.
(4) When an operator discovers and carries out the re-prescan of the error (for example, the skew was [having mistaken the page orientation which inputted the document which is not a reading object,] too large) of a picture by processing from a prescan to field analysis, processing time can be shortened as compared with the conventional method.
[0024]An embodiment 2. book embodiment performs "scanning" processing (S4) in Embodiment 1 by a different method, and other processings are the same as that of Embodiment 1. Drawing 5 is a flow chart of a "scan" concerning the embodiment of the invention 2. Hereafter, Embodiment 2 is described based on drawing 5. First, the rectangle (39, 59) which includes all the fields from the area information in the field memory 4, and (374,492) are computed (S31). This processing is the same as that of Embodiment 1. The maximum resolution in Table 2 and area information to image input mode is 400DPI, and converts said rectangle in 400DPI. This reduced property is set to (312,472) and (2992-3936). And a somewhat larger rectangle (232,392), for example, a rectangle vertically and horizontally large every about 5 mm, than the rectangle shown by these coordinates and (3072-4016) are set up (S32).
[0025]The image input of this rectangle is carried out by maximum resolution 400DPI and a multiple value (S33). This processing is the same as that of Embodiment 1. According to Table 3, a gap is amended for the multi value image data inputted by S33 every four fields, and image data is extracted (S34). Drawing 6 is an explanatory view explaining the correcting method of a gap. The method of amendment a gap is explained based on drawing 6. Data is checked in each neighborhood (scan line) of every about the rectangle formed of the coordinates shown in Table 3, and it moves in a scan line until existence **** moves in the direction for which what is not a white picture element (it is not zero) extends a frame in a scan line and at least one data of each

neighborhood becomes only a white picture element on each neighborhood. On the other hand, when only a white picture element exists each neighborhood, it moves in the direction which narrows a frame in a scan line, and it moves in a scan line until what is not a white picture element appears in a scan line.
[0026]The rectangle data in the field memory 4 is updated to what amended the gap by processing of S34 (S35). The extracted image data is changed according to the resolution and the conversion method of Table 2 for every field (S36). This processing is the same as that of Embodiment 1. Next, the changed image data is stored in the image memory 2 for every field (S37). This processing is the same as that of Embodiment 1.
[0027]As mentioned above, since according to the Embodiment 2 the gaps (the cause of a gap: the difference in resolution, movement of an input sentence document, aging of a scanner part, etc.) of image data with a prescan and a scan are amended and the image data of a field can be extracted correctly, lack of image data and space are avoidable. For this reason, reading processing can be done correctly.
[0028]In the above-mentioned Embodiments 1 and 2, although the example scanned by a multiple value was shown, it can also scan by picture ON KAMODO (a color, a binary) required of a result output. It can also scan in the image input mode of specification with every field. In this case, this function is needed for a scanner part. Although processed by amendment of the gap in processing of S34 by Embodiment 2 at the image data of the multiple value, once it changes a multiple value binary, a gap can also be amended to binary image data.
[0029]
[Effect of the Invention]As explained above, according to this invention, the effect taken below can be acquired. Since picture reduction becomes unnecessary by conducting field analysis of the image data inputted with the low resolution, shortening of processing time and mitigation of the processing load of a document reader are attained. Since the image input only of the area part is carried out after field analysis, the image data of blank parts other than a field can become unnecessary, and image memory capacity can be reduced, and the processing time after a scan can be shortened. Since an image input is carried out in the mode corresponding to a field kind after field analysis, image data suitable for the processing after recognition can be obtained, and reduction of down stream processing and shortening of processing time are attained.

TECHNICAL FIELD

[Field of the Invention]This invention relates to the character recorded on the document, and the document reader which reads images (figures, pictures, photographs, ruled lines, etc. other than a character).

PRIOR ART

[Description of the Prior Art]Drawing 7 is a flow chart of the reading processing in the conventional document reader, and is a flow chart of the processing scanned especially without a prescan with high resolution from the beginning. Based on drawing 7, the reading processing in the conventional document reader is explained. First, the image input of the reading object document is carried out with high resolution (S101). The high resolution images inputted by S101 are displayed on a display, and an operator specifies the range required for reading by a frame (S103). When a reading range is a whole page, processing of this frame specification is

unnecessary.
[0003]Next, the reduction image which is needed for field analysis is created (S105). Drawing 8 is an explanatory view explaining creation of a reduction image. In drawing 8, 210 is the high-resolution image data inputted by processing ofS101, and 211 are the reduced image data created by processing ofS105. If this reducing process has a 1 or more dot black pixel, for example in high resolution images of 8x8 dots, 1 dot of reduction images will be made into black, and if all of high resolution images are white picture elements, let 1 dot of reduction images be whites. Namely, to field analysis, the high-resolution image data is unnecessary, and there should just be rough (low resolution) image data. Next, a field is extracted from the reduction image created by S105, and field analysis discriminated from a picture feature with a character and an image about this field is conducted further (S107). And the character of a high-resolution image data is recognized based on the result of this field analysis (S109). This recognition result is stored in a memory, or it prints to a printer, a recognition result is outputted, and processing is ended (S111).
[0004]Drawing 9 is a flow chart of the reading processing in other conventional document readers, and the prescan of it is carried out especially with a low resolution, and it specifies a reading frame. Based on drawing 9, the reading processing in a ****** reader is outlined conventionally. First, a prescan is carried out with a low resolution, a low resolution picture is inputted (S121), the inputted low resolution picture is displayed on a display, and an operator specifies a reading range by a frame (S123). Next, a reading frame portion is scanned and an image input is carried out with high resolution (S125). The same processing as S105-S111 which were shown in drawing 7 is performed after this.

EFFECT OF THE INVENTION

[Effect of the Invention]As explained above, according to this invention, the effect taken below can be acquired. Since picture reduction becomes unnecessary by conducting field analysis of the image data inputted with the low resolution, shortening of processing time and mitigation of the processing load of a document reader are attained. Since the image input only of the area part is carried out after field analysis, the image data of blank parts other than a field can become unnecessary, and image memory capacity can be reduced, and the processing time after a scan can be shortened. Since an image input is carried out in the mode corresponding to a field kind after field analysis, image data suitable for the processing after recognition can be obtained, and reduction of down stream processing and shortening of processing time are attained.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, there are the following problems in the conventional method described above. That is, the reduction image creation which is processing of S105 needs to be processed. In order to acquire pictures (a multiple value, a color, etc.) other than the high resolution images which are needed by the processing after recognition processing (S109), a re-scan is required, but when re-scanning after field analysis, re-scanning time will start for a long time. High resolution images other than a required field will be inputted, and the process flow shown in drawing 7 will take useless time.

MEANS

[Means for Solving the Problem]A document reader of this invention is characterized by comprising:
A low resolution picture input means which scans a character or an image recorded on a recording medium, changes into a picture signal, carries out digital conversion of this picture signal, and creates image data of a low resolution.
A low resolution picture memory which stores this image data.
A field analysis means to create area information based on low resolution image data in this low resolution picture memory.
A region image input means which rescans a character or an image recorded on said recording medium according to area information in a field memory which stores this area information, and this field memory, and creates that required image data for every field, A region image memory which stores this image data, and a character recognition means which recognizes image data of a character area in said region image memory, and creates recognition data according to area information in said field memory, Result output **** which creates arbitrary document data from area information in a recognition memory which stores this recognition data, and image data in said region image memory and said field memory, and recognition data in said recognition memory, and outputs this document data to an output media.

[0007]In a document reader constituted as mentioned above, a character or an image recorded on a recording medium is scanned, image data of a low resolution is created, and area information is created based on this low resolution image data. And a character or an image recorded on said recording medium according to this area information is rescanned, and that required image data is created for every field. According to said area information, image data of a character area is recognized and recognition data is created. Arbitrary document data is created from image data, area information, and recognition data, and this document data is outputted to an output media.
[0008]
[Embodiment of the Invention]
Embodiment 1. drawing 1 is a block diagram showing the composition of a 1st embodiment of this invention. In a figure, 1 is an image input part, it scans optically all/some of document of a reading object, changes into a picture signal the character and image which were recorded on the document by photoelectric conversion, and changes this picture signal into the image data of binary / multiple value / false multiple value / color further. 2 is an image memory and stores the image data outputted from the face image input part 1. 3 is an area analysis section, it extracts a field from the image data (low resolution binary) in the image memory 2, discriminates each field from a character with an image, and creates area information. 4 is a field memory and stores the area information outputted from the area analysis section 3.
[0009]5 is a character recognition section, cuts down and carries out character recognition of the character image of this image data for every single character, and changes it into a character code from the area information in the field memory 4, and the image data in the image memory 2. And let this character code be recognition data. The character recognition section 5 can carry out the knowledge based system of this recognition data, and can also correct it. 6 is a recognition memory and stores the recognition data outputted from the character recognition section 5. 7 is a result output part and The image data in the image memory 2, and the area information in the field memory 4, Document data is created from the recognition data in the recognition memory

6, and (at least one of image data, area information, and the recognition data), and this document data is printed with the printer 8, or it stores in the output memories 9. And these output memories 9 are passed and they are other document data processing systems (document data is passed to a word processor, a DTP system, a documentation management system (not shown), etc.). Or document data can also be passed to other document data processing systems by communication (not shown).
[0010]10 is an indicator which consists of CRT etc. 11 is a final controlling element which consists of a keyboard, a mouse, etc. -- reading processing (the whole.) The interface of the operator and document reader of a start and termination indication, the display of a processing result (image data, area information, and recognition data), its check, correction, etc., etc. which are called processing is taken. [a part]
[0011]Drawing 2 is a flow chart of operation of the embodiment constituted as mentioned above. Hereafter, operation of this embodiment is explained based on drawing 2. First, the prescan which carries out an image input with a low resolution by the image input part 1 is carried out (S1). By the image input part 1, a prescan scans the input sentence document of a reading object, changes into a picture signal the character recorded on the document, and an image by photoelectric conversion, and changes this picture signal into the image data of a binary low resolution (for example, 50DPI) further. And this image data is stored in the image memory 2.
[0012]After an image input finishes, an operator specifies a reading frame using the indicator 10 and the final controlling element 11 (S2). That is, the image data in the image memory 2 is displayed on the indicator 10, an operator looks at this display, and a portion required for reading is specified as a reading frame (a rectangle, a polygon) using the final controlling element 11. This reading frame specification is used when avoiding the shadow by a copy, or reading only one article in newspaper, and reading a part of image data. In order to operate it simply, when you do not specify a reading frame, let all the image data be reading objects.
[0013]After reading frame specification finishes, field analysis is conducted by the area analysis section 3 (S3). Field analysis extracts an area frame from the image data in the image memory 2 corresponding to said reading frame by the area analysis section 3 first using a character, the method which uses the marginal distribution histogram of a black pixel for an image, or the method using a run length. And a field is identified according to the geometric feature of each field to a character area (according to specification of an operator, it is not necessary to identify automatically discernment of Japanese/English, and Japanese/English), and an image (figure/photograph) field. And let this area frame and its kind be area information.
[0014]This field analyzing method is the same as that of the field analysis to a reduction image. This area information and image data are displayed on the indicator 10 in piles, and an operator checks and corrects area information. The area information after a check / correction is stored in the field memory 4. An example of the image data (: which does not specify a reading frame a reading object all the image data) of the area information is shown in drawing 3. Field analysis of this image data is conducted, and the Japanese field 21, the English field 22, the graphic region 23, and the photographic area 24 are extracted. Table 1 expresses this area information in a table.
[0015]
[Table 1]

Xs	Ys	Xe	Ye	種類
39	59	197	197	和文
236	59	374	217	英文
39	256	197	492	図形
236	256	374	354	写真

解像度：50 DPI

[0016]In Table 1, the coordinates of the peak at the upper left of a field, and "Xe, Ye" are coordinates of the peak at the lower right of a field (a field is expressed with a rectangle and expressed with the dot number in resolution 50DPI at the time of a prescan), and "the kind of "Xs, Ys"" is a discriminated result of a field. After field analysis finishes, the scan which carries out an image input in the mode corresponding for every field by the image input part 1 is carried out (S4). By the image input part 1, this scan carries out the image input of the portion corresponding to the area information in the field memory 4 by corresponding picture ON KAMODO.

[0017]Drawing 4 is a flow chart of the example of this scan, and explains this scan based on drawing 4 below. First, the rectangle (39, 59) which includes all the fields from the area information in the field memory 4, and (374,492) are computed (S21). Table 2 is a table showing the kind of read object, and the image input mode to this.

[0018]

[Table 2]

種類	画像入力モード	
	解像度(DPI)	変換方式
和文	４００	単純２値
英文	２００	単純２値
図形	２００	単純２値
写真	２００	疑似多値

[0019]As shown in Table 2, the maximum resolution in the image input mode of the image data shown in drawing 3 is 400DPI to Japanese, and if said rectangle is converted in 400DPI (312,472), it will be set to (2992-3936) (S22). The image input of this rectangle (312,472) and (2992-3936) is carried out by maximum resolution 400DPI and a multiple value (S23).

[0020]Table 3 converts the peak of each field shown in Table 1 in maximum resolution 400DPI.

[Table 3]

	Xs	Ys	Xe	Ye
1120	312	472	1576	1576
1130	1888	472	2992	1736
1140	312	2048	1576	3936
1150	1888	2048	2992	2832

400DPIでの換算値

[0021]The multi value image data inputted by S22 according to Table 3 is extracted every four fields (S24). The extracted image data is changed according to the resolution and the conversion method of Table 2 for every field (S25). The changed image data is stored in the image memory 2 for every field (S26), and processing of a scan is ended. A scan (S4) recognizes a character to be ****** by the character recognition section 5 (S5). It is as follows when the method of this character recognition is outlined. First, a line is started using the method of using the marginal distribution histogram of a black pixel, or the method of using a run length from the image data in the image memory 2 corresponding to the character area of the area information in the field memory 4, and a character is further started from a line. It changes into a character code (the reliability of candidates characters and candidates characters is included) with pattern matching using the recognition dictionary which stored the recognition feature of the standard character which is in the character recognition section 5 about the cut-down character image next. A knowledge based system can be carried out using the word dictionary which is in the character recognition section 5 about this character code, and the knowledge dictionary which stored the grammar rule, and a character code can also be corrected (the reliability of a ** assistant word and a candidate word is created).

[0022]Let this character code (candidates characters and a candidate word are included) and reliability be recognition data. This recognition data is displayed on the indicator 10 (comparing with the picture of a character area), and an operator checks and corrects recognition data. The recognition data after a check / correction is stored in the recognition memory 6. After recognition finishes, a reading result is outputted by the result output part 7 (S6). The result output part 7 Namely, image data in the image memory 2 and area information in the field memory 4, Document data is created from the recognition data in the recognition memory 6, and (at least one of image data, area information, and the recognition data), and this document data is printed with the printer 8, or it stores in the output memories 9.

[0023]According to the Embodiment 1, the effect taken below can be acquired as mentioned above.

(1) Since picture reduction becomes unnecessary by conducting field analysis of the image data inputted with the low resolution, shortening of processing time and mitigation of the processing load of a document reader are attained.

(2) Since the image input only of the area part is carried out after field analysis, the image data of blank parts other than a field can become unnecessary, and image memory capacity can be reduced, and the processing time after a scan can be shortened.

(3) Since an image input is carried out in the mode corresponding to a field kind after field analysis, image data suitable for the processing after recognition can be obtained, and reduction of down stream processing and shortening of (an image input etc. are unnecessary in an example:photographic part at a false multiple value) and processing time are attained.

(4) When an operator discovers and carries out the re-prescan of the error (for example, the skew was [having mistaken the page orientation which inputted the document which is not a reading object,] too large) of a picture by processing from a prescan to field analysis, processing time can be shortened as compared with the conventional method.

[0024]An embodiment 2. book embodiment performs "scanning" processing (S4) in Embodiment 1 by a different method, and other processings are the same as that of Embodiment 1. Drawing 5 is a flow chart of a "scan" concerning the embodiment of the invention 2. Hereafter, Embodiment 2 is described based on drawing 5. First, the rectangle (39, 59) which includes all the fields from the area information in the field memory 4, and (374,492) are computed (S31). This processing is the same as that of Embodiment 1. The maximum resolution in Table 2 and area information to image input mode is 400DPI, and converts said rectangle in 400DPI. This reduced property is set to (312,472) and (2992-3936). And a somewhat larger rectangle (232,392), for example, a rectangle vertically and horizontally large every about 5 mm, than the rectangle shown by these coordinates and (3072-4016) are set up (S32).

[0025]The image input of this rectangle is carried out by maximum resolution 400DPI and a multiple value (S33). This processing is the same as that of Embodiment 1. According to Table 3, a gap is amended for the multi value image data inputted by S33 every four fields, and image data is extracted (S34). Drawing 6 is an explanatory view explaining the correcting method of a gap. The method of amendment a gap is explained based on drawing 6. Data is checked in each neighborhood (scan line) of every about the rectangle formed of the coordinates shown in Table 3, and it moves in a scan line until existence **** moves in the direction for which what is not a white picture element (it is not zero) extends a frame in a scan line and at least one data of each neighborhood becomes only a white picture element on each neighborhood. On the other hand, when only a white picture element exists each neighborhood, it moves in the direction which narrows a frame in a scan line, and it moves in a scan line until what is not a white picture element appears in a scan line.

[0026]The rectangle data in the field memory 4 is updated to what amended the gap by processing of S34 (S35). The extracted image data is changed according to the resolution and the conversion method of Table 2 for every field (S36). This processing is the same as that of Embodiment 1. Next, the changed image data is stored in the image memory 2 for every field (S37). This processing is the same as that of Embodiment 1.

[0027]As mentioned above, since according to the Embodiment 2 the gaps (the cause of a gap: the difference in resolution, movement of an input sentence document, aging of a scanner part, etc.) of image data with a prescan and a scan are amended and the image data of a field can be extracted correctly, lack of image data and space are avoidable. For this reason, reading processing can be done correctly.

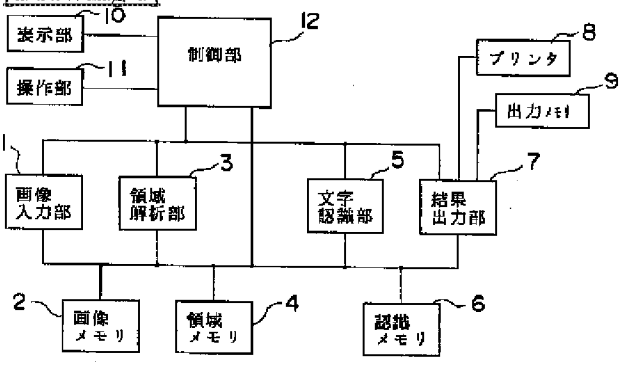
[0028]In the above-mentioned Embodiments 1 and 2, although the example scanned by a multiple value was shown, it can also scan by picture ON KAMODO (a color, a binary) required of a result output. It can also scan in the image input mode of specification with every field. In this case, this function is needed for a scanner part. Although processed by amendment of the gap in processing of S34 by Embodiment 2 at the image data of the multiple value, once it changes a multiple value binary, a gap can also be amended to binary image data.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a block diagram of the embodiment of this invention.
[Drawing 2]It is a processing flow chart of the embodiment of this invention.
[Drawing 3]It is a figure showing the example of the image data in the embodiment of this invention.
[Drawing 4]It is a flow chart of the scanning and processing in Embodiment 1 of this invention.
[Drawing 5]It is a flow chart of the scanning and processing in Embodiment 2 of this invention.
[Drawing 6]It is an explanatory view explaining the gap amendment in Embodiment 2 of this invention.
[Drawing 7]It is a flow chart of the reading processing in the conventional document reader.
[Drawing 8]It is an explanatory view explaining creation of the reduction image in the conventional document reader.
[Drawing 9]It is a flow chart of the reading processing in other conventional document readers.
[Description of Notations]
1 Image input part
2 Image memory
3 Area analysis section
4 Field memory
5 Character recognition section
6 Recognition memory
7 Result output part
8 Printer
9 Output memories
10 Indicator
11 Final controlling element
12 Control section

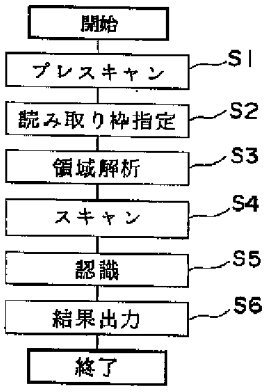
DRAWINGS

[Drawing 1]



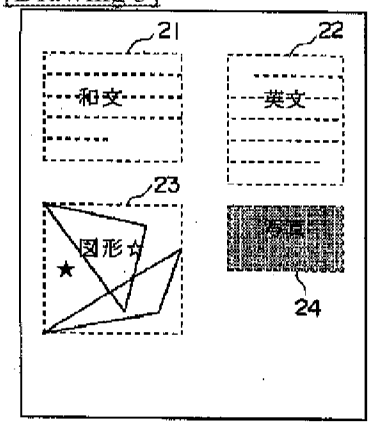
本発明の実施形態のブロック図

[Drawing 2]



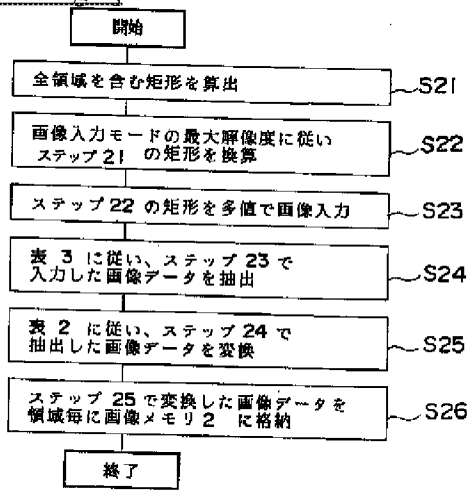
本発明の実施形態の処理フローチャート

[Drawing 3]



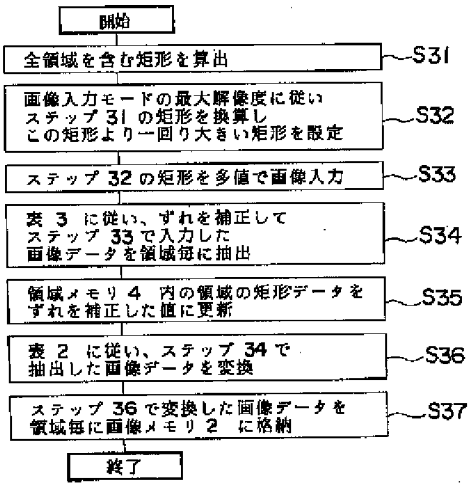
実施形態における画像データの例を示す図

[Drawing 4]



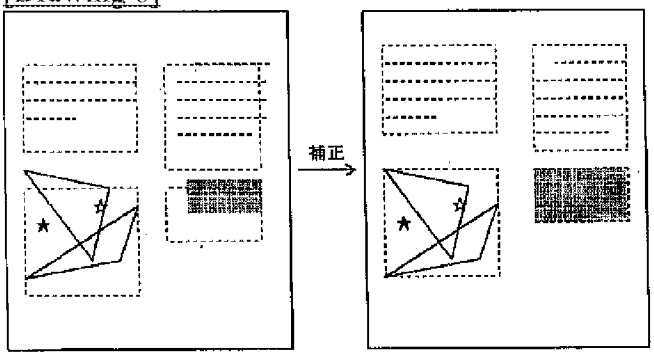
実施形態１におけるスキャン処理のフローチャート

[Drawing 5]



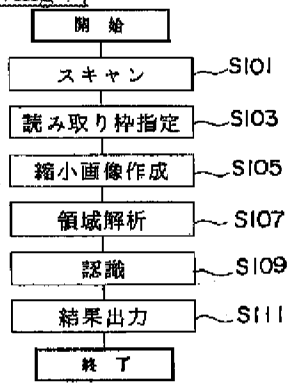
実施形態２におけるスキャン処理のフローチャート

[Drawing 6]



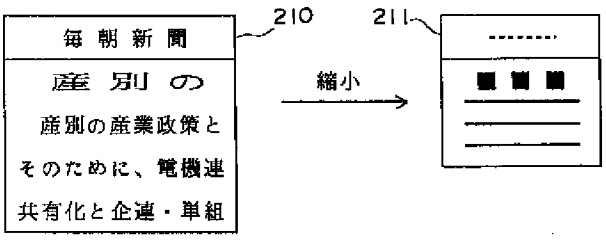
実施形態２におけるずれ補正を説明する説明図

[Drawing 7]



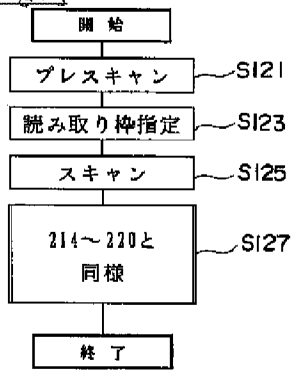
従来の読み取り処理のフローチャート

[Drawing 8]



従来の文書読取装置における縮小画像の作成の説明図

[Drawing 9]



従来の他の読み取り処理のフローチャート

Your Ref: 07844-249JP1
Our Ref: PA941

Translation of Selected Portions of Pat. Laid-open Official Gazette

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Inventor(s): Tetsuo Nakamura
Applicant(s): Oki Electric Industry K.K.
Attorney(s): Kenji Onishi

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1. Title of the Invention

DOCUMENT READING APPARATUS

2. Claims

(omitted)

3. Detailed Description of the Invention (Selected Portions)

1)

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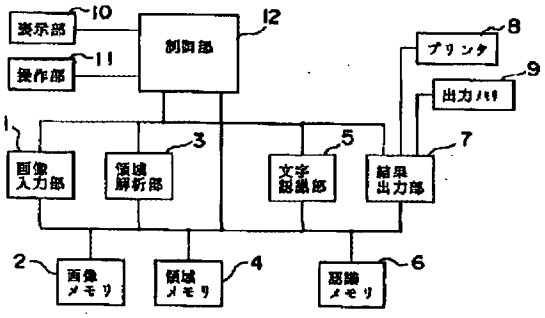
(54)【発明の名称】　文書読取装置

(57)【要約】

【課題】　画像縮小処理が不要で、画像メモリ容量を削減でき、処理時間の短縮と文書読取装置の処理負荷の軽減が図れる文書読取装置を得る。

【解決手段】　記録媒体上に記録された文字あるいはイメージを走査し低解像度の画像データを作成し、この低解像度画像データに基づいて領域データを作成する。そして、この領域データに従って前記記録媒体上に記録された文字あるいはイメージを再走査して各領域毎にその必要な画像データを作成する。さらに、前記領域データに従い、文字領域の画像データを認識して認識データを作成する。またさらに、画像データ、領域データ、および認識データから任意の文書データを作成し、この文書データを出力媒体に出力する。



本発明の実施形態のブロック図

1

【特許請求の範囲】

【請求項１】　記録媒体上に記録された文字あるいはイメージを走査し画像信号に変換し、この画像信号をデジタル変換して低解像度の画像データを作成する低解像度画像入力手段と、

この画像データを格納する低解像度画像メモリと、

この低解像度画像メモリ内の低解像度画像データに基づいて領域データを作成する領域解析手段と、

この領域データを格納する領域メモリと、

この領域メモリ内の領域データに従って前記記録媒体上に記録された文字あるいはイメージを再走査して各領域毎にその必要な画像データを作成する領域画像入力手段と、

この画像データを格納する領域画像メモリと、

前記領域メモリ内の領域データに従い、前記領域画像メモリ内の文字領域の画像データを認識して認識データを作成する文字認識手段と、

この認識データを格納する認識メモリと、

前記領域画像メモリ内の画像データ、前記領域メモリ内の領域データ、および前記認識メモリ内の認識データから任意の文書データを作成し、この文書データを出力媒体に出力する結果出力手段とを備えたことを特徴とする文書読取装置。

【請求項２】前記領域画像入力手段は、領域メモリ内の領域データと再走査した画像データとのずれを補正する機能を備えていることを特徴とする請求項１記載の文書読取装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、文書上に記録された文字とイメージ（文字以外の図形、絵、写真および罫線など）を読み取る文書読取装置に関する。

【０００２】

【従来の技術】図７は従来の文書読取装置における読み取り処理のフローチャートであり、特にプレスキャンなしで最初から高解像度でスキャンする処理のフローチャートである。図７に基づいて、従来の文書読取装置における読み取り処理を説明する。まず、高解像度で読み取り対象文書を画像入力する（Ｓ１０１）。Ｓ１０１で入力した高解像度画像を表示装置に表示して読み取りに必要な範囲をオペレータが枠で指定する（Ｓ１０３）。なお、読み取り範囲がページ全体の場合はこの枠指定の処理は不要である。

【０００３】次に、領域解析のために必要となる縮小画像を作成する（Ｓ１０５）。図８は縮小画像の作成を説明する説明図である。図８において２１０はＳ１０１の処理で入力した高解像度画像データであり、２１１はＳ１０５の処理で作成した縮小画像データである。この縮小処理は、例えば８×８ドットの高解像度画像に１ドット以上黒画素があれば縮小画像１ドットは黒とし、高解像度画像の全部が白画素ならば縮小画像１ドットは白とする。すなわち、領域解析には高解像度画像データは不要であり、おおまかな（低解像度）画像データがあれば良いのである。次に、Ｓ１０５で作成した縮小画像から領域を抽出し、さらに、この領域について画像特徴から文字とイメージに識別する領域解析をする（Ｓ１０７）。そして、この領域解析の結果に基づいて、高解像度画像データの文字を認識する（Ｓ１０９）。さらに、この認識結果をメモリに格納したり、プリンタに印刷したりして認識結果の出力をして、処理を終了する（Ｓ１１１）。

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【０００４】図９は従来の他の文書読取装置における読み取り処理のフローチャートであり、特に低解像度でプレスキャンして読み取り枠を指定するものである。図９に基づいて、従来り文書読取装置における読み取り処理を概説する。まず、低解像度でプレスキャンして低解像度画像を入力し（Ｓ１２１）、入力された低解像度画像を表示装置に表示して読み取り範囲をオペレータが枠で指定する（Ｓ１２３）。次に、読み取り枠部分をスキャンして高解像度で画像入力する（Ｓ１２５）。これ以降は図７に示したＳ１０５～Ｓ１１１と同様の処理を行う。

【０００５】

【発明が解決しようとする課題】しかし、以上述べた従来の方法では、以下のような問題点がある。すなわち、Ｓ１０５の処理である縮小画像作成の処理が必要である。また、認識処理（Ｓ１０９）以降の処理で必要となる高解像度画像以外の画像（多値、カラーなど）を得るためには、再スキャンが必要であるが、領域解析後に再スキャンする場合は、再スキャン時間が長くかかってしまう。さらに、図７に示した処理フローでは必要な領域以外の高解像度画像を入力することとなり、無駄な時間を要することになる。

【０００６】

【課題を解決するための手段】本発明に係る文書読取装置は、記録媒体上に記録された文字あるいはイメージを走査し画像信号に変換し、この画像信号をデジタル変換して低解像度の画像データを作成する低解像度画像入力手段と、この画像データを格納する低解像度画像メモリと、この低解像度画像メモリ内の低解像度画像データに基づいて領域データを作成する領域解析手段と、この領域データを格納する領域メモリと、この領域メモリ内の領域データに従って前記記録媒体上に記録された文字あるいはイメージを再走査して各領域毎にその必要な画像データを作成する領域画像入力手段と、この画像データを格納する領域画像メモリと、前記領域メモリ内の領域データに従い、前記領域画像メモリ内の文字領域の画像データを認識して認識データを作成する文字認識手段と、この認識データを格納する認識メモリと、前記領域画像メモリ内の画像データ、前記領域メモリ内の領域デ

ータ、および前記認識メモリ内の認識データから任意の文書データを作成し、この文書データを出力媒体に出力する結果出力手投とを備えたものである。

【０００７】上記のように構成された文書読取装置においては、記録媒体上に記録された文字あるいはイメージを走査し低解像度の画像データを作成し、この低解像度画像データに基づいて領域データを作成する。そして、この領域データに従って前記記録媒体上に記録された文字あるいはイメージを再走査して各領域毎にその必要な画像データを作成する。さらに、前記領域データに従い、文字領域の画像データを認識して認識データを作成する。またさらに、画像データ、領域データ、および認識データから任意の文書データを作成し、この文書データを出力媒体に出力する。

【０００８】

【発明の実施の形態】

実施の形態１．図１は、本発明の第１の実施の形態の構成を示すブロック図である。図において、１は画像入力部であり、読み取り対象の文書の全部／一部を光学的に走査し、文書上に記録された文字とイメージを光電変換により画像信号に変換し、さらに、この画像信号を二値／多値／疑似多値／カラーの画像データに変換する。２は画像メモリであり、面像入力部１から出力される画像データを格納する。３は領域解析部であり、画像メモリ２内の（低解像度二値）画像データから領域を抽出し、それぞれの領域を文字とイメージに識別して領域データを作成する。４は領域メモリであり、領域解析部３から出力される領域データを格納する。

【０００９】５は文字認識部であり、領域メモリ４内の領域データと、画像メモリ２内の画像データとから、この画像データの文字画像を一文字毎に切り出し、文字認識して文字コードに変換する。そして、この文字コードを認識データとする。さらに、文字認識部５は、この認識データを知識処理して修正することもできる。６は認識メモリであり、文字認識部５から出力される認識データを格納する。７は結果出力部であり、画像メモリ２内の画像データと、領域メモリ４内の領域データと、認識メモリ６内の認識データと（画像データ、領域データ、認識データの少なくとも一つ）から文書データを作成し、この文書データをプリンタ８で印刷し、または、出力メモリ９に格納する。そして、この出力メモリ９を介して、他の文書データ処理システム（ワープロ、ＤＴＰシステム、文書管理システムなど（図示せず）に文書データを渡す。または、通信により他の文書データ処理システムに文書データを渡すこともできる（図示せず）。

【００１０】１０はＣＲＴなどからなる表示部である。１１はキーボード、マウスなどからなる操作部であり、読み取り処理（全体、一部）の開始・終了指示、処理結果（画像データ、領域データ、および認識データ）の表示およびその確認・修正などの処理といったオペレータと文書読取装置とのインタフェースをとるものである。

【００１１】図２は上記のように構成された実施の形態の動作のフローチャートである。以下、図２に基づいて本実施形態の動作を説明する。まず、画像入力部１により低解像度で画像入力するプレスキャンをする（Ｓ１）。プレスキャンは画像入力部１により、読み取り対象の入力文書を走査し、文書上に記録された文字、およびイメージを光電変換により画像信号に変換し、さらにこの画像信号を二値低解像度（たとえば５０ＤＰＩ）の画像データに変換する。そして、この画像データを画像メモリ２に格納する。

【００１２】画像入力が終わると、表示部１０と操作部１１を使ってオペレータが読み取り枠を指定する（Ｓ２）。すなわち、画像メモリ２内の画像データを表示部１０に表示し、この表示をオペレータが見て読み取りに必要な部分を操作部１１を使って読み取り枠（矩形、多角形）として指定するのである。なお、この読み取り枠指定は、コピーによる影を避けたり、新聞の一つの記事だけを読み取る場合など、画像データの一部を読み取るときに使うものである。また、操作を簡単にするため、読み取り枠を指定しない場合は全画像データを読み取り対象とする。

【００１３】読み取り枠指定が終わると、領域解析部３により領域解析する（Ｓ３）。領域解析は、まず、領域解析部３により、前記読み取り枠に対応する画像メモリ２内の画像データから文字とイメージを、黒画素の周辺分布ヒストグラムを利用する方式、または、ランレングスを利用する方式を使って領域枠を抽出する。そして、それぞれの領域の幾何学的特徴により領域を（和文／英文、和文／英文の識別はオペレータの指定に従い、自動的に識別しなくても良い）文字領域とイメージ（図形／写真）領域に識別する。そして、この領域枠とその種類を領域データとする。

【００１４】この領域解析方法は縮小画像に対する領域解析と同様である。この領域データと画像データを表示部１０に重ねて表示し、オペレータが領域データを確認・修正する。確認・修正後の領域データを領域メモリ４に格納する。領域データのうちの画像データ（読み取り枠は指定しない：読み取り対象は全画像データ）の一例を図３に示す。この画像データを領域解析して、和文領域２１、英文領域２２、図形領域２３および写真領域２４を抽出する。表１は、この領域データを表で表わしたものである。

【００１５】

【表１】

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Xs	Ys	Xe	Ye	種類
39	59	197	197	和文
236	59	374	217	英文
39	256	197	492	図形
236	256	374	354	写真

解像度：50 DPI

【００１６】表１において、「Ｘｓ、Ｙｓ」は領域の左上の頂点の座標、「Ｘｅ、Ｙｅ」は領域の右下の頂点の座標であり（領域は矩形で表わし、プレスキャン時の解像度５０ＤＰＩでのドット数で表現している）、「種類」は領域の識別結果である。領域解析が終わると、画像入力部１により領域ごとに対応するモードで画像入力するスキャンをする（Ｓ４）。このスキャンは画像入力部１により、領域メモリ４内の領域データに対応する部分を対応する画像入力モードで画像入力するのである。

【００１７】図４はこのスキャンの例のフローチャートであり、以下このスキャンを図４に基づいて説明する。まず、領域メモリ４内の領域データから全領域を含む矩形（３９，５９）、（３７４，４９２）を算出する（Ｓ２１）。表２は読取り対象の種類とこれに対する画像入力モードを示した表である。

【００１８】

【表２】

種類	画像入力モード	
	解像度(DPI)	変換方式
和文	４００	単純２値
英文	２００	単純２値
図形	２００	単純２値
写真	２００	疑似多値

【００１９】表２に示すように、図３に示した画像データの画像入力モードの最大解像度は和文に対する４００ＤＰＩであり、前記矩形を４００ＤＰＩで換算すると（３１２，４７２）、（２９９２，３９３６）となる（Ｓ２２）。この矩形（３１２，４７２）、（２９９２，３９３６）を最大解像度４００ＤＰＩ、多値で画像入力する（Ｓ２３）。

【００２０】表３は表１に示した各領域の頂点を最大解像度４００ＤＰＩで換算したものである。

【表３】

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	Xs	Ys	Xe	Ye
1120	312	472	1576	1576
1130	1888	472	2992	1736
1140	312	2048	1576	3936
1150	1888	2048	2992	2832

400DPIでの換算値

【００２１】表３に従いＳ２２で入力した多値画像データを四つの領域ごとに抽出する（Ｓ２４）。抽出した画像データを領域ごとに表２の解像度と変換方式に従い変換する（Ｓ２５）。変換した画像データを領域毎に画像メモリ２に格納し（Ｓ２６）、スキャンの処理を終了する。スキャン（Ｓ４）が終わると、文字認識部５により文字を認識する（Ｓ５）。この文字認識の方法を概説すると次の通りである。まず、領域メモリ４内の領域データの文字領域に対応する画像メモリ２内の画像データから、黒画素の周辺分布ヒストグラムを利用する方法、または、ランレングスを利用する方法を使って行を切り出し、さらに、行から文字を切り出す。つぎに、切り出した文字画像を文字認識部５内にある標準的な文字の認識特徴を格納した認識辞書を用いたパターンマッチングにより文字コード（候補文字、候補文字の確信度を含む）に変換する。さらに、この文字コードを文字認識部５内にある単語辞書、文法ルールを格納した知識辞書を使って知識処理して文字コードを修正（候補単語、候補単語の確信度を作成）することもできる。

【００２２】この文字コード（候補文字、候補単語を含む）や確信度を認識データとする。この認識データを表示部１０に表示し（文字領域の画像と比較し）、オペレータが認識データを確認・修正する。確認・修正後の認識データを認識メモリ６に格納する。認識が終わると、結果出力部７により読み取り結果を出力する（Ｓ６）。すなわち、結果出力部７は、画像メモリ２内の画像データと、領域メモリ４内の領域データと、認識メモリ６内の認識データと（画像データ、領域データ、認識データの少なくても一つ）から文書データを作成し、この文書データをプリンタ８で印刷し、または、出力メモリ９に格納するのである。

【００２３】以上のように実施の形態１によれば、つぎに示す効果を得ることができる。

（１）低解像度で入力した画像データを領域解析することにより画像縮小が不要になるので、処理時間の短縮と文書読取装置の処理負荷の軽減が可能になる。

（２）領域解析後に領域部分だけを画像入力するので、領域以外の空白部分の画像データが不要になり画像メモリ容量を削減でき、また、スキャン以降の処理時間を短縮できる。

（３）領域解析後に領域種類に対応したモードで画像入

力するので、認識以降の処理に適した画像データを得られ、処理工程の削減と（例：写真部分を疑似多値で画像入力などが不要）、処理時間の短縮が可能になる。

（４）プレスキャンから領域解析までの処理で画像の誤り（例えば、読み取り対象でない文書を入力した、用紙方向を間違えた、スキューが大き過ぎたなど）をオペレータが発見し、再プレスキャンする場合、従来の方法に比較して処理時間を短くできる。

【００２４】実施の形態２．本実施の形態は実施の形態１における「スキャン」処理（Ｓ４）を異なる方法で行うものであり、その他の処理は実施の形態１と同様である。図５は本発明の実施の形態２にかかる「スキャン」のフローチャートである。以下、図５に基づいて実施の形態２を説明する。まず、領域メモリ４内の領域データから全領域を含む矩形（３９，５９）、（３７４，４９２）を算出する（Ｓ３１）。この処理は実施の形態１と同様である。表２と領域データから画像入力モードの最大解像度は４００ＤＰＩであり、前記矩形を４００ＤＰＩで換算する。この換算値は（３１２，４７２）、（２９９２，３９３６）となる。そして、この座標によって示される矩形より一回り大きい矩形、たとえば、上下左右に約５ｍｍずつ大きい矩形（２３２，３９２）、（３０７２，４０１６）を設定する（Ｓ３２）。

【００２５】この矩形を最大解像度４００ＤＰＩ、多値で画像入力する（Ｓ３３）。この処理は実施の形態１と同様である。表３に従い、Ｓ３３で入力した多値画像データを四つの領域毎にずれを補正して画像データを抽出する（Ｓ３４）。図６はずれの補正方法を説明する説明図である。図６に基づいてずれの補正の方法を説明する。表３に示す座標によって形成される矩形について各辺（走査ライン）ごとにデータの確認を行い、各辺上に白画素でない（ゼロでない）ものが一つでも存在すれは枠を広げる方向に走査ラインを移動し、各辺のデータが白画素のみになるまで走査ラインを移動する。一方、各辺に白画素のみが存在する場合は枠を狭める方向に走査ラインを移動し、走査ラインに白画素でないものが現れるまで走査ラインを移動するのである。

【００２６】領域メモリ４内の矩形データをＳ３４の処理によりずれを補正したものに更新する（Ｓ３５）。抽出した画像データを領域毎に表２の解像度と変換方式に従い変換する（Ｓ３６）。この処理は実施の形態１と同様である。次に、変換した画像データを領域毎に画像メモリ２に格納する（Ｓ３７）。この処理も実施の形態１と同様である。

【００２７】以上のように、実施の形態２によれば、プレスキャンとスキャンとの画像データのずれ（ずれの原因：解像度の違い、入力文書の移動、スキャナ部の経時変化など）を補正し、正確に領域の画像データを抽出できるので、画像データの欠如、余白を避けられる。このため、正確に読み取り処理ができる。

【００２８】なお、上記の実施の形態１，２においては、多値でスキャンする例を示したが結果出力で必要な画像入力モード（カラー、二値）でスキャンすることもできる。また、領域ごとに指定の画像入力モードでスキャンすることもできる。この場合にはこの機能がスキャナ部に必要となる。また、実施の形態２で、Ｓ３４の処理におけるずれの補正で多値の画像データで処理したが、一度、多値を二値に変換をしてから二値の画像データに対してずれの補正をすることもできる。

【００２９】

【発明の効果】以上説明したように本発明によれば、つぎに示す効果を得ることができる。低解像度で入力した画像データを領域解析することにより画像縮小が不要になるので、処理時間の短縮と文書読取装置の処理負荷の軽減が可能になる。また、領域解析後に領域部分だけを画像入力するので、領域以外の空白部分の画像データが不要になり画像メモリ容量を削減でき、また、スキャン以降の処理時間を短縮できる。さらに、領域解析後に領域種類に対応したモードで画像入力するので、認識以降の処理に適した画像データを得られ、処理工程の削減と処理時間の短縮が可能になる。

【図面の簡単な説明】

【図１】本発明の実施形態のブロック図である。

【図２】本発明の実施形態の処理フローチャートである。

【図３】本発明の実施形態における画像データの例を示す図である。

【図４】本発明の実施形態１におけるスキャン処理のフローチャートである。

【図５】本発明の実施形態２におけるスキャン処理のフローチャートである。

【図６】本発明の実施形態２におけるずれ補正を説明する説明図である。

【図７】従来の文書読取装置における読み取り処理のフローチャートである。

【図８】従来の文書読取装置における縮小画像の作成を説明する説明図である。

【図９】従来の他の文書読取装置における読み取り処理のフローチャートである。

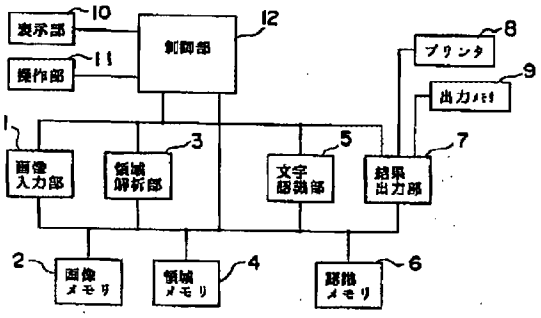
【符号の説明】

１　画像入力部
２　画像メモリ
３　領域解析部
４　領域メモリ
５　文字認識部
６　認識メモリ
７　結果出力部
８　プリンタ
９　出力メモリ
１０　表示部

９　　１０

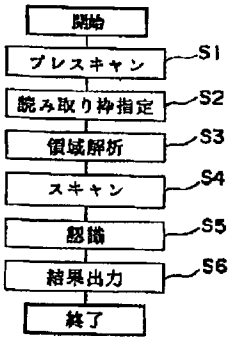
１１　操作部　　＊　＊１２　制御部

【図１】



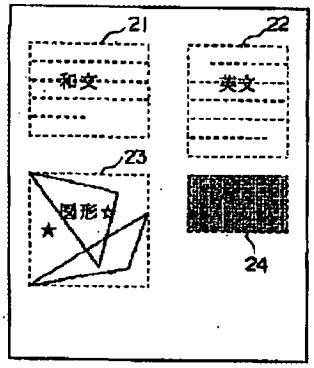
本発明の実施形態のブロック図

【図２】



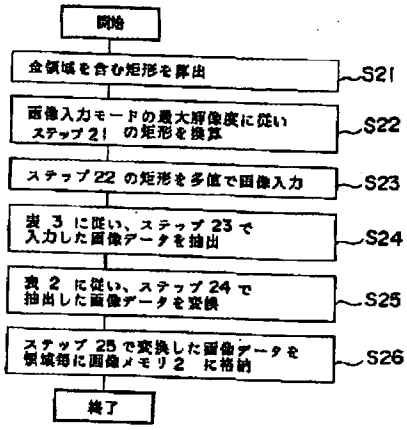
本発明の実施形態の処理フローチャート

【図３】



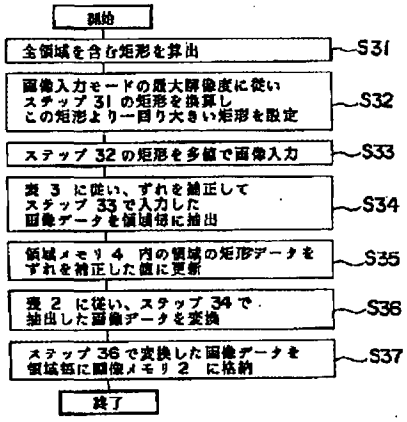
実施形態における画像データの例を示す図

【図４】



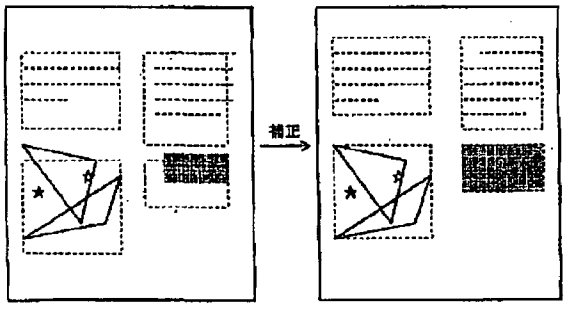
実施形態１におけるスキャン処理のフローチャート

【図５】



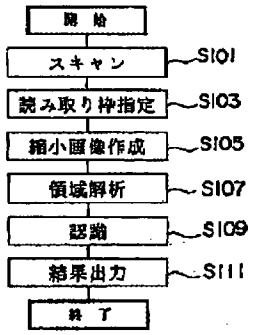
実施形態２におけるスキャン処理のフローチャート

【図６】



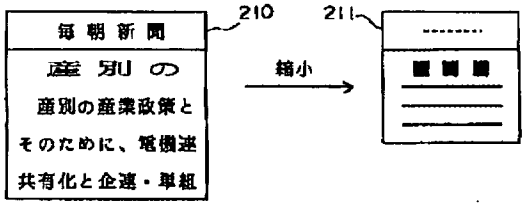
実施形態２におけるずれ補正を説明する説明図

【図７】



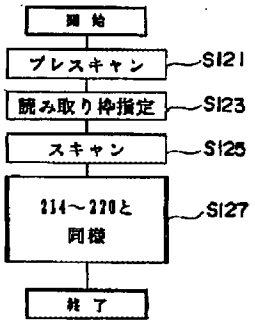
従来の読み取り処理のフローチャート

【図８】



従来の文書読取装置における縮小画像の作成の説明図

【図９】



従来の他の読み取り処理のフローチャート